



SMART MIRROR WITH ALEXA USING RASPBERRY PI

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Abstract: This world has been changed with the internet coming into existence where every person holds a smart device and this has become a necessary part in day to day activity. Time is very precious, so people do not waste any time on unnecessary thing. There are indefinite ways to make every object smarter every day. We can consider mirrors which provide a greater surface area which can be the perfect area for displaying information and interacting with it. Every home will definitely have a mirror which can be upgraded to a smart mirror. The smart mirror will have a display screen inside and you would be able to interact with the mirror. The main features would be date, weather, news, holidays, events, home automation, Alexa.

I. INTRODUCTION

Time management is an important aspect of our life. Multitasking along with technology helps us to maintain an efficient schedule. Recent development in technology has shown a way to automate things around us.

Our paper shows in detail one of the major advancement in technology in the field of IoT that is a "smart mirror". This project shows an interface for glancing information while you look into the mirror and the added feature of Alexa based on Amazon Voice services, will act as personal assistance and will interact with the user.

In this generation everyone expects everything to happen at a faster pace and due to the hectic and busy schedule, people would make mistakes without the required information for their day. every person needs the necessary information about how his activities should go in a day. someday you might get absolutely no time to check for news updates or weather updates to plan for the future. keeping a mobile phone or laptop in your bathroom would not be a solution, hence a simple display which can be shown is necessary and talking to this mirror or display is what people expect nowadays.

II. LITERATURE SURVEY

"What is the need of a Smart Mirror?"[1] In the previous year's technology has become a major part in our day to day lives. Technology has been most important in many electronic devices. But the motive of designing a 'Smart Mirror' is to bring technology in a traditional household mirror and making it smart. This brought in a new face to a smart mirror: "a smart mirror is a mirror with additional features and functions, with the aim of introducing capabilities for human interaction". There was always a need of designing a device which would help in planning for a day's activities by doing other household activities. A mirror is one such place where we visit often and thus can get basic details such as time, daily news, and events, etc.

"A Mobile-Programmable Smart mirror for Ambient IoT Environment"[2] describes the development and design of Interactive magic mirror which offers simplified and customizable services to the home environment. This shows us the display and updates and only the smart mirror.

The Smart mirror also controls home appliances with very less human intervention using a mobile application.[3] For controlling home appliances, the mobile needs to be paired with the smart mirror successfully. "Smart Mirror for Smart Life" describes about the monitoring and controlling of home-based devices with the mirror. To ease the human tasks and develop interaction between people and system, the mirror system uses Alexa technology as a medium. The Smart mirror takes voice commands as input to give response and Alexa is an amazon web service application that can quickly and easily add VUI (Voice User Interface) to any hardware or software. Hence, the user can activate voice services by just saying the command, Alexa.

Toshiba launched their smart mirror concept.[4] They applied gesture control as an input method. Toshiba showcased their smart mirror in different home



environments. They designed the smart mirror in such a way that each room would possess a smart mirror with different features based on the room it was placed. In the bathroom, the smart mirror displayed functions like weather forecast, date, heads up notification and display monitor.

Proposed System:

Our solution is an advanced platform for display development. We have implemented an aesthetic mirror with smart features underneath it. The flexibility of this device allows it to be feasible to any size or place. It is user friendly and shows both your face and information you need simultaneously. This smart mirror of ours enables the user to be interactive and also with our built in voice assistant, Alexa from Amazon, the user can control different modules and also provide its basic services. This Mirror gives the user an enriching experience while using the mirror in day-to-day life by providing all the necessary information required such as, date, time, weather, news, and holidays for planning ahead in time

III. METHODOLOGY

Our project methodology was divided into four main sectors, based on the scope of work involved. These four sectors are:

1. DESIGN: -

- **Dimensions:**

We had to come up with the dimensions for the mirror. Finally, we decided to take the dimensions of the television which we used as the LCD display. The dimensions of the television is 43" × 73", therefore we decided to go with the same dimension for the mirror. Work- 43" × 73" dimension

- **Frame Fabrication:**

We used ply wood to make the frame for the entire display and mirror structure. The frame was screwed together with clamps so that the structure would be stiff and sturdy.

Work-Wooden box frame.

- **Mirror details:**

We had to make sure that the mirror we use will portray the LCD display along with its functionality as a normal mirror. So, we decided to go with a two way mirror of dimension 43" × 73" which satisfies all the requirements.

Work- 43" × 73" Two-way mirror

- **Microcontroller used:**

We went with the Raspberry pi 3 as it is simple, easy to program and budget friendly for our project. We had a lot of resources for this project and all those online resources

mentioned that the raspberry pi 3 was the most preferable choice.

Work- Raspberry pi 3

- **Display used:**

The display we used is television whose dimensions are 43" × 73".

Work- TCL 43" × 73" Television

2. Microcontroller Programming: -

MagicMirror2 software: MagicMirror2 is an open-source modular smart mirror platform. It has a growing list of many installable modules which makes it user friendly and gives more functions to the smart mirror. This work involved a lot of procedure to install all the modules and then write a python program to enable all the modules.

Work: MagicMirror2 boots in the raspberry pi terminal window when the command is given.

3. Fabrication: -

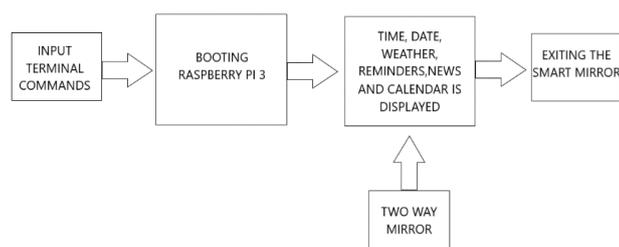
Firstly, we constructed the frame box using plywood to hold the television and the mirror together. We found a dealer who supplied us with the two way mirror. The two way mirror was properly aligned with the television, so that the television display won't glare on the mirror. Then, the raspberry pi was connected to the television fusing HDMI to HDMI cable and also the power supply for raspberry pi was given through the television. Finally, the microphone was connected to the raspberry pi to take the voice commands from the user. When the power supply was turned ON, the raspberry pi started booting and then the smart mirror starts when the appropriate command is given in the terminal.

Work: Display, Television, raspberry pi and the frame box aligned together.

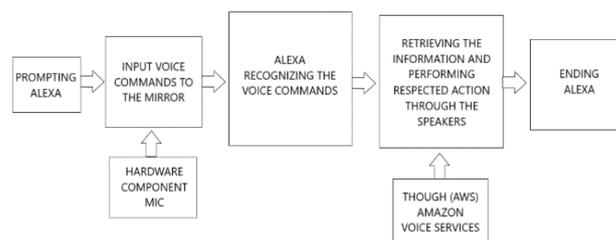
4. Working: -

A. Smart mirror as a mirror: When we use a normal mirror for our daily essentials, we can use the same mirror in a smarter way with the smart mirror. The mirror works both way for displaying the content and your face clearly.

B. Smart mirror as Information system: The smart mirror is a hub of all gathered necessary information. It provides the user with the data needed for his daily activities. The information consists with the basics time weather news and other interesting details.



tasks such as home automation, gathering news, updates on sports and answering IQ questions and so on.



C. Smart mirror as Alexa: The smart mirror also provides the key features of an interactive voice assistance which is alexa. The alexa can be commanded to do multiple

IV. PROPOSED WORK

1) Hardware: -

The proposed smart mirror is built using the following tools:

- Operating system (Raspberry pi)
- Two-way mirror
- Television (as the LCD screen)
- Microphone
- Speaker
- Wood frame

The raspberry pi is set up by downloading the operating system, which is copied to a SD card and then connect the SD card to the raspberry pi. The television which acts as the display screen is connected to the raspberry pi using a HDMI to HDMI cable. The microphone and the speaker are configured with the raspberry pi. With suitable coding and downloading necessary modular applications, all contents like news, weather, date, time, notifications and voice assistance can be accessed. After compiling, all the contents will be displayed on the screen and the voice assistance can be accessed using the wake-up word “Alexa”.

2) Software: -

Python is an open-source programming tool which is used in the Raspberry pi. The python programming language is very easy to interpret and is modular in structure this supports the smart mirror to performer better. Raspberry software is the best operating system, and its hardware is assembled in an organized way which supports the python language.

Raspbian Software:

Firstly, we need to download raspbian operating system into our computer and its image must be written into the SD card. The SD card must be inserted into the raspberry pi. After booting up the raspberry pi we can give the terminal command to enter the smart mirror.

Alexa Software:

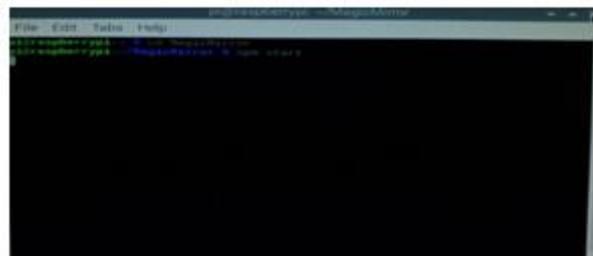
Alexa Voice Services by Amazon is an AI voice-controlled assistant for various parameters such as daily updates, news,

weather, general knowledge questions and home automation. Alexa allows two-way interaction with multiple systems online.

V. RESULTS

1)Terminal: -

The code required to run the smart mirror. This code cd MagicMirror takes us to the directory folder which has the required contents for running the Magic Mirror successfully.



First, we introduce the code where “cd MagicMirror” will take it too the directory where magic mirror code is existing. Then we execute the commands present in the directory with “npm start”.

2) Smart Mirror Working Model: -

After all the commands are executed the smart mirror boots and starts it functions as shown. One can see the date and time displayed on the smart mirror. Where in the seconds, minutes and hours are displayed. The date is displayed in day, month, date, year format. The different locations weather updates can also be viewed, depending on the location the variety news updates will be shown according to the user’s location



Features

1. Home automation
2. Maps display
3. General knowledge questions
4. Calling between interconnected alexa

VI. CONCLUSION

Our project is made keeping in mind this busy day to day schedule where common man may not have so much time to spend on check each update through separate gadgets.

Smart mirror is a tool which solves these issues and provides the intended information on to the one big screen and this screen is always looked upon and hence a user can derive the information from the system whilst doing other work.

There is a lot of future scope for the smart mirror as many modules can be included which performs different tasks on the raspberry pi and displayed through the screen. We can develop our own module for any specific function which can be induced into the smart mirror by just adding that module into the program. Now starting the smart mirror after rebooting, the smart mirror will perform the required function.

VII. ACKNOWLEDGEMENT

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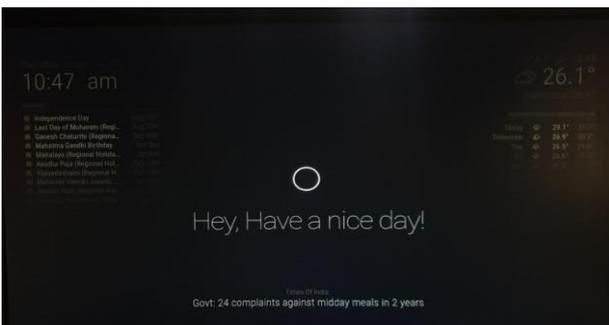
VIII. REFERENCES

- [1]. <https://www.seminaronly.com/computer%20science/smart-mirror-seminar-report-ppt.php>.
- [2]. Piyush Maheshwari, Maninder Jeet Kaur, Sarthak Anand, "Smart Mirror: A Reflective Interface to Maximize Productivity", International Journal of Computer Applications (0975 – 8887), Year: May-2017.
- [3]. Mohammed Ghazal, Tara al Hadithy, Yyasmina al Khalil, Muhammad Akmal and Hassan Hajjdiab, " a Mobile-programmable smart mirror for ambient IoT environments", in 5th international conference on future internet of things and cloud workshops, 2017.
- [4]. S. Tanwar, P. Patel, K. Patel, S. Tyagi, N. Kumar and M. S. Obaidat, "An advanced Internet of Thing based Security Alert System for Smart Home," 2014

3) Alexa: -

Alexa taking the input signals which is human voice and processes these audio input signals to processes the data required. Alexa uses AWS services and get the updates through its servers and interacts with user

1. When we give commands such as "alexa what is the weather in bangalore " it replies "weather in bangalore is 28 degree celsius and humidity is 28."
2. "alexa who is prime minister of india" it replies " prime minister of india is narendra modi"
3. "alexa turn on the gyser and light" replies " gyser and light has been turned on do u need a timer for it?"



By using the keys CNTRL+Q we can exit the smart mirror. We need to exit the smart mirror to access or edit any other modules if needed.

4) Fully Working Model: -





International Conference on Computer, Information and Telecommunication Systems (CITS), Dalian, 2014, pp. 25-29.

- [5]. <https://www.ijert.org/research/magic-mirror-an-intelligent-tool-for-elderly-people-IJERTCONV6IS15094.pdf>
- [6]. http://ijasret.com/VolumeArticles/FullTextPDF/394_5.IoT_BASED_SMART_MIRROR_USING_RASPBERRY_Pi_4.pdf
- [7]. <https://www.ijitee.org/wp-content/uploads/papers/v9i6/F4702049620.pdf>